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PLANT COVER, SOIL TEMPERATURE, FREEZE, WATER STRESS, AND
EVAPOTRANSPIRATION CONDITIONS

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Science and Education Administration
U.S. Department of Agriculture
P. O. Box 267
Weslaco, TX 78596

September 1979

TYPE II Quarterly Progress Report
for Period September 1, 1979 to December 1, 1979

Prepared for

GODDARD SPACE FLIGHT CENTER
Greenbelt, MD 20771

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Ultimately, we believe these cloud detection procedures will allow us to determine those test sites that are clear or partly clear from those that are obscured. This result will permit us to more fully utilize the clear HCMM data for each ground site of interest and avoid erroneous interpretation due to cloud contamination.

2. <u>CCT processing procedures</u>.

The following will be applied to each HCMM scene:

a. Locate test site in magnetic tape, by referring to transparencies and/or Dicomed display.

b. Determine digital count range of the test site.

c. Prepare IR gray map on line printer--invert daytime data to match nighttime record sequence (because of opposite direction of satellite travel).

d. Find georeference sites in IR data and produce location equations that relate pixel line and sample to latitude and longitude. Cut and try to obtain minimum error of fit by discarding poorly identified georeference site as indicated by computer analysis.

e. Assign the IR value of the nearest pixel to each coordinate cell (20-seconds latitude x 20-seconds longitude). Store these data on disc.

f. Repeat steps a through f with VIS data.

g. Graphically represent six parallel IR (and VIS) transects that cross the test site.

h. Select and apply "threshold" values to the IR data so as to exclude all cloud contaminated data from further analysis. Determine threshold value by plot of individual IR cell values vs corresponding VIS cell values, and by examination of IR (and VIS) transect graphs.

i. Prepare IR gray map of test site using only retained, noncontaminated data.

j. Printout mini-maps of thermal environment surrounding all sites (Intensive sites, Synoptic sites, Weather Sta. sites). Identify which cells in the 9x9 cell scene were cloud contaminated.

k. Calculate mean temp. and std. deviation of the 9x9 cell area surrounding (or comprising) the site. Include only cloud-free cells in the calculations.

l. Prepare histogram of temperatures in the 9x9 cell areas, excluding cloud contaminated cells.

m. Prepare summary table of surface temperatures at all sites for 1x1, 3x3, 5x5, 7x7 and 9x9 cell areas. Tabulate mean values and number of cloud-free cells in each size area.

n. Compare surface temperatures with air temperatures measured at the weather stations.

o. Determine the mean temperatures and standard deviations of the 34 soil associations of the test area (exclude cloud contaminated data from analysis).

p. (Required to be done only once). Determine the centroid of the area of each soil association. Info. to be used in adjusting for marine influences.

q. Determine histograms of agricultural area and rangeland area.

r. Using the frequency distribution of the agricultural area (excluding cloudy cells), determine the temperature limits for Cold, Medium, and Warm areas, such that one-third of the area falls in each classification.

s. Prepare map of test site showing areas of Warm and Cold classification.

t. Overlay selected daytime IR maps of test site and show the frequency of recurrence of warm (cold) conditions at each cell location. Exclude from consideration all cloud contaminated cell values. Represent the percentage of occurrence of the warm (cold) condition at each cell location by printing the following symbols on a map of the test site:

2 = 15 to 25% of the time
3 = 25 to 35
. . . . . .
9 = 85 to 95
0 = 95 to 100% of the time

u. Overlay selected nighttime IR maps in similar manner to item t.

v. Using selected pair of day/night IR scenes prepare a disc file of temp. differences, cell by cell. Process this "difference" data according to the procedures of steps g, i, j, k, l, m, n, q, r and s.

These processing steps are extensive but are necessary to derive the data to meet the various objectives of the contract. The programs to perform these processing steps have all been written and the procedures through u have been executed for at least one scene. During the next quarter work will proceed in earnest to process additional scenes according to these procedures. To date we have 7 scenes in 800 bpi format and another 7 scenes either ordered or CCT have been returned to Goddard for reformatting to 800 bpi.

C. Significant Results:

Since most of our scenes are at least partly cloudy, we have investigated procedures to edit cloud-contaminated pixels from those pixels representing earth surface features. Because clouds are more reflective than earth features and clouds are colder than earth surface features most of the year at our latitude (26°N), either a raw digital count ratio or a ratio of reflectance percentage for the VIS band to the temperature (°C) from the thermal band works well. For this procedure, the two bands of data need to be registered to the ground scene; we think we are doing that to about ±1 pixel. The procedure should make scenes that would otherwise be discarded at least partially usable for analysis.

D. Publications:

None.

E. Recommendations:

Be sure to have data processors that have access to the format specifications on the data product orders.

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Allotment for FY 80 - - - - - - - - - -	20,000.00
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Location and Indirect Program Costs - - -	$26,959.00
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Total	$108,875.00
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G. Data Utility:

CCT received and on order should be adequate to test the objectives of the experiment.

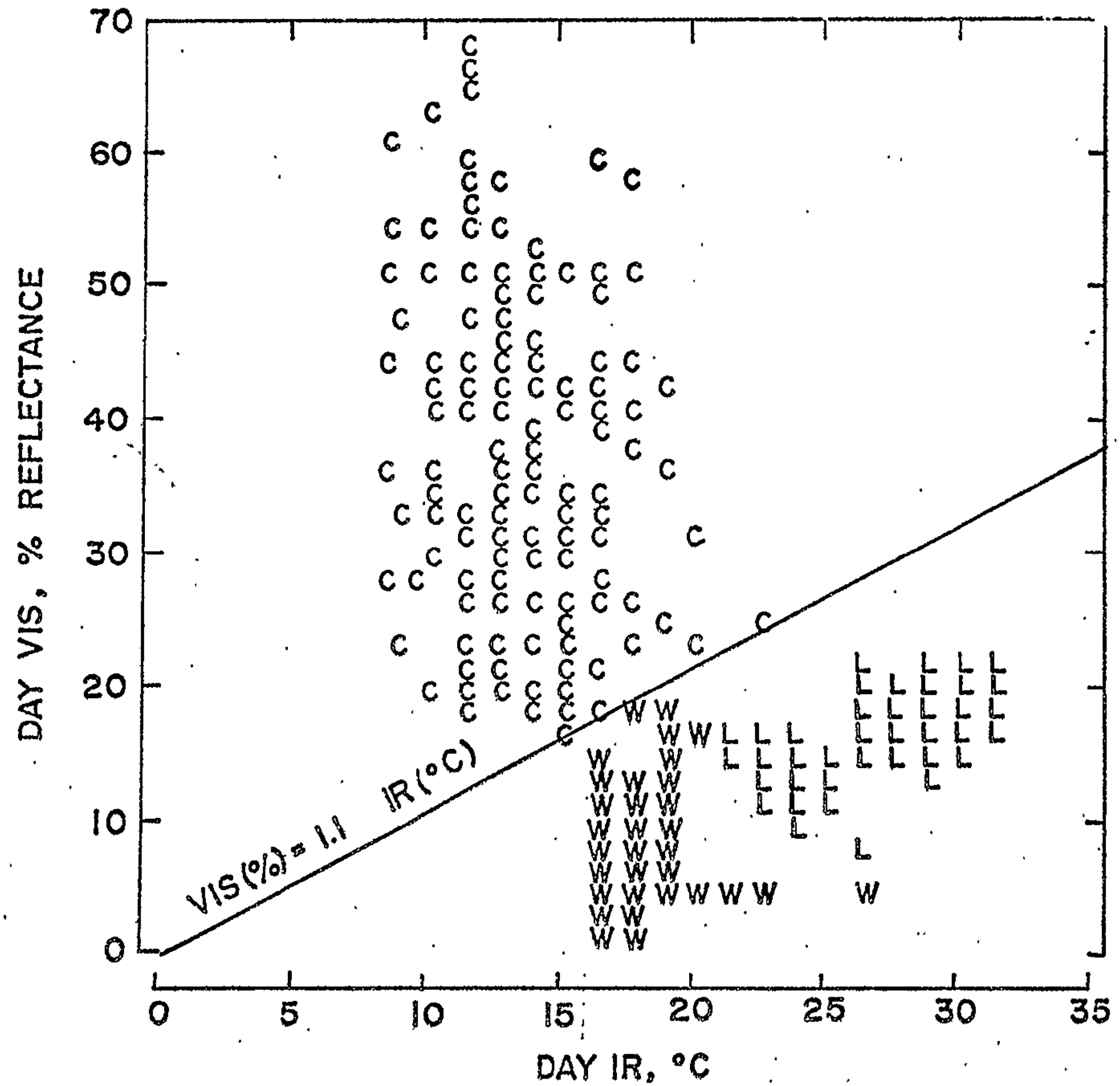

Fig. 1. Day Visible (Reflectance) versus Day IR (Temperature) for a sample of the June 12, 1978, overpass data for clouds (C), land (L), and water (W). The procedure is used to edit cloud-contaminated pixels from those for earth surface features.

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UNITED STATES DEPARTMENT OF AGRICULTURE
SCIENCE AND EDUCATION ADMINISTRATION

AGRICULTURAL RESEARCH
SOUTHERN REGION
Soil and Water Conservation Research
P. O. Box 267
Weslaco, Texas 78596

December 7, 1979

Subject: Type II Quarterly Progress Report #8
September 1, 1979 to December 1, 1979
HCMM NASA Contract S-40198B
Goddard ID: HCM-002

To: HCMM Investigations Support, Code 902.6
Goddard Space Flight Center
Greenbelt, MD 20771

Ten copies of subject Type II Quarterly Progress Report #8 are enclosed in fulfillment of contract provisions.

Craig Wiegand
Craig L. Wiegand
Principal Investigator

Enclosures

cc:
H. W. Gausman
E. A. Taylor
P. R. Nixon

Original Report sent to:

✓ NASA Scientific and Technical Inform. Facility
6571 Elkridge Landing Road
Linthicum, Maryland 21090

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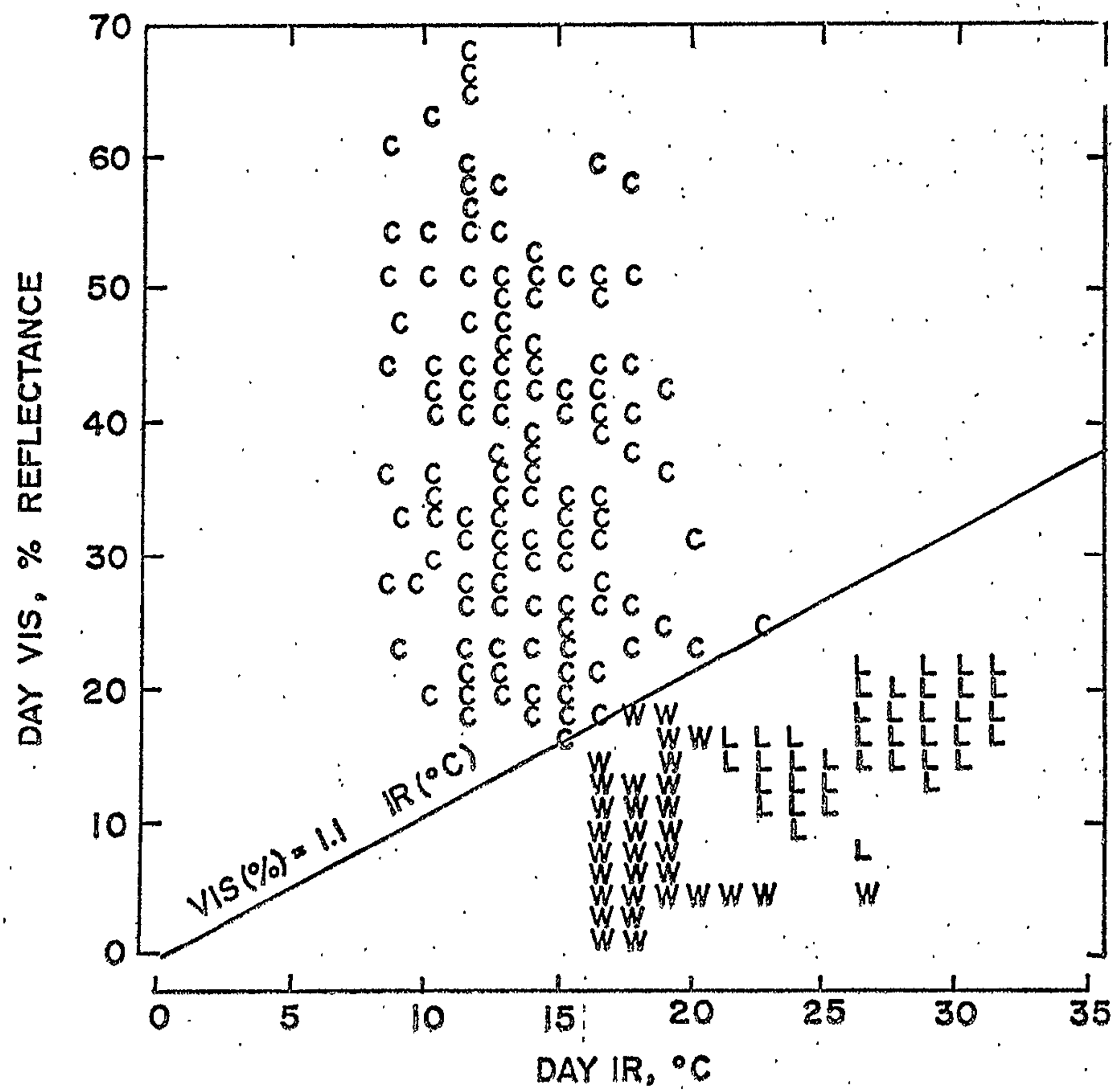

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